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SOME POINTS BROUGHT OUT BY SUCCESSIVE SURVEYS OF THE SAME FARMS.[1]

H. W. HAWTHORNE,

OFFICE OF FARM MANAGEMENT.

In the early years of farm management surveys, conclusions were based upon the data obtained for but a single year. A great deal of care was used in selecting the areas, and any in which some unusual conditions prevailed within the year were avoided. In other words, it was the aim to select only areas where practically normal conditions prevailed throughout the year to which the data pertained. But for all that, many persons interested in agricultural problems wondered whether conclusions based upon these single-year surveys were applicable to any year save that to which the data pertained.

To aid in throwing some light upon this question, the Office of Farm Management a few years ago planned to conduct several surveys, each extending over a period of years, and each located in a representative agricultural region.

These continued-surveys, as we have been calling them, are now being conducted in seven areas, as follows:

1. The hill section of Ohio.
2. A dairy section of Wisconsin.
3. The Corn Belt in Indiana.
4. A trucking district of New Jersey.
5. An apple-growing section of the Shenandoah Valley in Virginia.
6. A trucking section of Florida.
7. A citrus fruit section also in Florida.

The surveys in the last four areas named have been conducted for but two or three years, while those in the first three areas have extended over a period of five years or longer. The discussions in this paper center around the three areas first named, for each of which there are records for five years or longer.

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[1] Paper read before the American Farm Management Association at Baltimore, Md., January 9, 1919.

Description of Each Area Under Discussion.

Since some of you may not be familiar with all of these areas it will, perhaps, be worth while to give here a brief description of each.

The Ohio Area.—The area in the hill country of Ohio is representative of much of the hill land drained by the Ohio River. The topography grades from rolling to very steep, and is often rocky, large unbroken fields being seldom found. The land is fairly productive and valued at $31 per acre. The farms are from four to nine miles from railroad points, and the wagon roads are hilly and unimproved. The farmers practice a general or mixed type of farming. The farms average around 160 acres, 22 per cent. of which is unimproved. (By unimproved land we mean woodland and wasteland as used in our survey records.) Approximately one-half of the land is used for pasture, and one-fourth in growing crops. Of the crop land about one-fourth is in corn, one-fourth in small grains—most of which is in wheat—and one-half in hay. Only six per cent. of the corn raised was sold, 35 per cent. of the wheat and 16 per cent. of the hay. Of the farm receipts, 15 per cent. was from crop sales, 6 per cent. from dairy products, 21 per cent. from cattle, 14 per cent. from sheep, 12 per cent. from hogs, and 17 per cent. from poultry.

In this area we have usable records from 25 farms for seven successive years, but the data for the last year was obtained quite recently and has not yet been tabulated.

The Wisconsin Area.—The area in Wisconsin is typical of a considerable part of the Wisconsin dairy region. The surface is rolling to hilly, the land is valued at $100 per acre, and only the main wagon roads are improved. The farms average 148 acres, of which 11 per cent. is unimproved; a little more than one-third of the land is in pasture, and a little more than one-half in crops. The crop land is divided almost equally among corn, the small grains and hay. Most of the small grain area is in oats. Practically all of the crops grown in this area are fed on the farms, and the crop sales are but 3 per cent. of the farm receipts. The sale of dairy products represents almost one-half of the total receipts. The sales of dairy products and cattle combined represent close to two-thirds of the farm receipts, while hog sales represent more than one-fourth of the receipts. In this area we have records from 60 farms for five successive years. This work was conducted coöperatively with the Wisconsin College of Agriculture.

The Indiana Area.—The area in Indiana is representative of much of the eastern part of the Corn Belt area. The surface is level to rolling. Much of the land is tile-drained, and it is valued at $185 per acre. The wagon roads are improved—most of them graveled—and railroad points are readily accessible the year round. The farms average 127 acres and but 5 per cent. of the land is unimproved. Approximately one-fourth of the land is in pasture and three-fourths in crops. Close to one-half of the crop land is in corn, one-third in the small grains—mainly oats—and the remainder in hay. A larger proportion of the crops produced in this area was sold from the farms than in either of the other areas. About 24 per cent. of the corn was sold, 80 per cent. of the oats, and 26 per cent. of the hay. Thirty-five per cent. of the farm receipts was from the sales of crops—mainly corn and oats—and about one-half from each, 40 per cent. was from hogs, and 13 per cent. from cattle. In this area we have records from 100 farms for five successive years.

Two-fold Object of This Discussion.

When these surveys were begun, we little dreamed that we were soon to be involved in a World War, one that would bring about a very abnormal condition for American farmers, so abnormal, indeed, as to divert us somewhat from the original object of these surveys. But, were the original object entirely lost, we feel the work well worth while, for we believe they furnish the most reliable data for tracing the effects of the war upon American agriculture. This presentation, will, therefore, have the two-fold object of showing variations as they occurred year after year, and the variations for the years prior to the War, as compared with the years during the War. Since the rapid advance in the prices of farm products did not begin until 1916, when speaking of the period before the War, we refer to the years prior to 1916, and when speaking of the period during the War, we refer to the years 1916 and 1917.

Variations in Labor Income over a Period of Years.

The labor income variation from year to year in each of these areas is of fundamental interest. (Table I.)

Table I.—*Labor incomes over a period of years in the Ohio, Wisconsin and Indiana areas.*

	1912.	1913.	1914.	1915.	1916.	1917.	Average of Years Before the War.	Average of Years During the War.
Ohio	$152	$110	$190	$160	$324	$635	$153	$480
Wisconsin	—	214	56	68	626	1075	113	850
Indiana	—	220	15	225	791	794	153	792

In the Ohio area the labor incomes for the years prior to the War ranged from $110 to $190. Omitting the year 1913, the range was from $152 to $190, which is a variation of only $38. The year 1913 might be considered below normal for the following reasons: It was the poorest wheat year—the yield per acre being scarcely more than one-half the averages of 1912, 1914 and 1915,—the quantity sold being less than one-half of the year of next lowest production, and less than one-fifth that of the year of highest production. The price was slightly lower than in 1912, 18 per cent. lower than in 1914, and 16 per cent. lower than in 1915. The apple crop was nearer a failure than any other year—the quantity sold being 17 per cent. of that of the next poorest year and only 3 per cent. of that of the best year. The price was from 5 per cent. to 30 per cent. lower than in other years. The price of wool was 20 per cent. lower than any other year.

Very low labor incomes are shown for the Wisconsin area in 1914 and 1915, which reflect the prices of dairy products and hogs for those years. In 1914 the prices received for dairy products were lower than any other year. They were slightly higher in 1915, but almost entirely overcome by the lower price of hogs.

The low labor income in the Indiana area in 1914 reflects the low corn yield, which was 10 bushels less per acre than in 1913 and 4 bushels less than in 1915. Hogs were lower in 1915 than any other year, and we would expect the reflection of this in labor income, but the crop sales were $278 more per farm than in 1914, oat sales were 38 per cent. more than in 1914 and wheat sales almost double.

All the areas show higher labor incomes in 1916 than in the earlier years, and the Ohio and Wisconsin areas still higher in 1917, owing to combinations of higher price levels and increased production. In Indiana the labor income in 1917 scarcely exceeded that of 1916 due to a severe hail storm which swept diagonally across the area in July. Had we used only the records of farms outside the strip affected by the hail storm, it is my judgment that the labor income for 1917 would have shown as much increase over 1916 as in the other areas.

The difference in actual value of the labor incomes for the years before the War and for the years during the War is less than indicated in this table, because a dollar had less purchasing value during the War than before.

VARIATIONS IN PER CENT. RETURN ON INVESTMENT OVER A PERIOD OF YEARS.

The per cent. return on the investment after deducting the farmer's labor from the farm income, may also be on interest. (Table II.)

It shows the same tendencies to variation as the labor incomes, but the variations are not so wide. It is worthy of note that in each area and for each year before the War the per cent. return on investment was under 5 per cent., while in each area and for each year during the War the per cent. return on the investment was over 5 per cent.

TABLE II.—*Per cent. return on investment*[1] *over a period of years in the Ohio, Wisconsin and Indiana areas.*

	1912.	1913.	1914.	1915.	1916.	1917.	Average of Years Before the War.	Average of Years During the War.
Ohio	2.8	2.2	3.4	3.0	5.4	7.8	2.8	6.6
Wisconsin	—	3.9	2.9	2.9	5.8	7.7	3.2	6.8
Indiana	—	4.6	3.8	4.6	6.7	6.5	4.3	6.6

RECEIPTS AND EXPENSES DURING THE WAR COMPARED WITH THOSE BEFORE THE WAR.

We have designed a table for a comparison of the increase in farm receipts and expenses for years during the War over those for the years before the War. (Table III.) In this table the receipts and expenses for the average of the years during the War are expressed as percentages of the averages for the years before the War. In the Ohio area the receipts during the War were 52 per cent. more than before the War, and the expenses 24 per cent. more; in the Wisconsin area the receipts were 55 per cent. more and the expenses 29 per cent., while in the Indiana area the receipts were 41 per cent. more and expenses 29 per cent. It may be observed that expenses did not increase as rapidly as receipts, the average percentage increase for all the areas being just about one-half as great. But if we carry the study a little further and separate the years 1916 and 1917, we find the percentage increase in expenses in 1916 was only about one-third as great as the increase in receipts (average of the three areas), while

TABLE III.—*Percentage receipts and expenses for the years during the War were of the years before the War in the Ohio, Wisconsin and Indiana areas.*

	Receipts.			*Expenses.*		
	Average of 1916 and 1917.	1916.	1917.	Average of 1916 and 1917.	1916.	1917.
Ohio	152	127	177	124	111	137
Wisconsin	155	136	174	129	116	143
Indiana	141	132	150	129	107	151
Average of three areas.	149	132	167	127	111	144

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[1] After deducting farmer's labor from farm income.

in 1917 it was about two-thirds as great, and it is my judgment that when the recently obtained 1918 data for the Ohio area is tabulated it will show the percentage increase in expenses equal to or in excess of the increase in receipts.

How Farmers "Speeded-up" during the War.

We have heard no little commendation for American farmers on their response to the food needs of the United States and the countries with which it was associated in the War. In keeping with this we have designed a table to show some of the ways in which the farmers in each of these areas, with little if any additional labor available, attempted to do their share in meeting the food crisis. (Table IV.)

In the Ohio area with an increase of only 2 per cent. in the amount of labor the crop area was increased 9 per cent. and the amount of live stock 15 per cent.

In the Wisconsin area with an increase of 4 per cent. in the amount of labor the crop acreage was maintained and the number of cows was increased 13 per cent.

In the Indiana area with no increase in the amount of labor the corn acreage was increased 15 per cent. and the number of hogs sold increased 5 per cent.

It is readily seen that the farmers in each area, as a whole, increased the volume of their business. Of course, there were all sorts of variations on individual farms,—some show a much greater increase than indicated by these figures, and some less.

Table IV.—*How farmers "speeded-up" during the war in the Ohio, Wisconsin and Indiana areas.*

The Ohio Area.

	Before the War.	During the War.	Percentage Increase.
Months of labor	17.3	17.6	2
Acres in crops	42	46	9
Number animal units	14.5	16.7	15

The Wisconsin Area.

	Before the War.	During the War.	Percentage Increase.
Months of labor	22.2	23.0	4
Acres in crops	81	81	0
Number cows	16.1	18.2	13

The Indiana Area.

	Before the War.	During the War.	Percentage Increase.
Months of labor	19.4	19.4	0
Acres in corn	40	46	15
Number of hogs sold	56	59	5

The response came along the line of the prevailing type which is perhaps the best type for the locality, and for which the farmers are best fitted. In other words, they did what they thought they could do best. In the Ohio area where most of the crops are marketed through live stock, about one-half of the livestock increase was in cattle, which is the major enterprise of the area. In the Wisconsin area—a dairy section—the increase was in the number of cows. In Indiana—an area in the Corn Belt—where most of the corn is fed to hogs—there was no increase in the crop acreage, but the cropping became more intensive by decreasing the acreage in small grains and in hay and increasing the corn acreage.

ANNUAL OUTPUT PER MAN.

In our study of the first five years in the Ohio area we have worked out the quantities of the several farm products that these farmers have put on the market annually per man. These quantities are shown by the accompanying table. (Table V.)

TABLE V.—*Annual output per man on 25 farms over a period of five years, Washington County, Ohio.*

Items.	Quantity.
Grain	2,822 pounds.
Roughage	6,042 pounds.
Potatoes	3 bushels.
Apples	15 barrels.
Eggs	486 dozen.
Wool	247 pounds.
Butter	124 pounds.
Cattle, live weight	1,850 pounds.
Hogs, live weight	1,089 pounds.
Sheep, live weight	600 pounds.
Poultry, live weight	196 pounds.
Equivalent of cattle, hogs, sheep and poultry in dressed meat	2,293 pounds.

The region represented by this area is generally regarded of much less importance agriculturally than either of the other areas, yet this region includes a considerable proportion of our rural population and of the farm land in the United States, and in addition to what it produces for home consumption, it makes a very appreciable contribution to the food and clothing supply of the nation as a whole.

These figures are given primarily to illustrate something that may be worked out for any area, whether it be a single-year study or one carried over several years. Such data are often of as much concern to our nation as are labor incomes, per cent. return on investment, or some other items that we always work out, and sometimes of even greater concern.

VARIATIONS IN LABOR INCOMES OF INDIVIDUAL FARMERS.

Heretofore we have concerned ourselves only with all the farms for which we have records every year in each of these areas. Now, we should like for a few moments to deal more especially with individual farms for successive years. We have already shown that there is yearly variation in the labor incomes of each area, and for which we have accounted in a general way. The variation of yearly labor incomes for individual farmers is somewhat greater than the average of all in any of these areas. (Table VI.)

TABLE VI.—*How 8 of the 25 Ohio farmers ranked in labor income for each of the six years.*

Farmer.	1912.	1913.	1914.	1915.	1916.	1917.
No. 1	1	1	2	3	3	1
No. 2	6	5	7	7	6	8
No. 3	23	24	22	24	25	25
No. 4	8	3	1	6	5	4
No. 5	7	2	6	1	9	18
No. 6	3	4	3	4	18	7
No. 7	9	7	17	5	1	2
No. 8	25	8	16	12	14	11

This table was designed to give you some idea of these variations with individual farmers, and it was thought to be of additional interest to show the relative standings of the men rather than the dollar labor incomes.

The farmers whose standings for each year as shown in this table were all selected from the group of 25 Ohio farmers.

Farmer No. 1 ranked highest in the group of 25 farms in 1912, highest in 1913, second in 1914, third in 1915, third in 1916, and highest in 1917.

Farmer No. 2 for the respective years ranked 6th, 5th, 7th, 7th, 6th, and 8th.

Farmer No. 3 for the respective years ranked 23d, 24th, 22d, 24th, 25th and 25th.

The relative standing of each of these three was quite uniform from year to year, in fact, they are the most uniform men in the group of 25.

The others shown here varied somewhat in their relative standing for the different years

Number 4 varied in rank from first in 1914 to eighth in 1912.
Number 5 from first in 1915 to eighteenth in 1917.
Number 6 from third in 1912 and 1914 to eighteenth in 1916.
Number 7 from first in 1916 to seventeenth in 1914.
Number 8 from eighth in 1913 to twenty-fifth in 1912.

If we care to look for the reasons for these variations in relative standing it affords a very interesting study—we think it one of the most interesting studies and one of most value in our continued surveys.

When the relative standing varies but 2 or 3 places it affords little of interest in studying the individual farmer from year to year, but when the relative standing varies 4 or 5, or 10 or 15 places in a group of 25 farms for different years we immediately become interested in determining the reasons therefor. Perhaps, were we unable to determine these reasons we should lose interest, but the fact is that in most instances we are able to ascertain with considerable accuracy wherein the farmer is more successful or less successful than he ordinarily is.

Let us look for a moment at Farmer No. 4. In 1912 he was eighth in relative standing, or lower than any other year. We find that year there was sickness in the family—his wife after long illness died, and his crop acreage was 12 per cent. less than any other year. In 1914 he was first in relative standing, and this year he increased his poultry flock and made good money on colts that he bought and afterwards sold. In 1915 he was sixth in relative standing and his income was reduced by the loss of a cow and a horse. In 1916 his relative standing was fifth, and his wheat index was lower than in any other year.

Take Farmer No. 5. In 1912 his rank was seventh, and he ranked lower among his neighbors in wheat yield per acre than he usually did. In 1913 he ranked higher in wheat yield per acre than ordinarily, and his hogs fed out exceptionally well. In 1914 he dropped lowest in hay yield per acre, which gave him a crop index of 104 against 113 the next lowest year. In 1916 he went below his ordinary standing in yield per acre of corn. In 1917 we find the greatest variation. This year he contracted steers for winter feeding on a cent-a-pound advance. His neighbors who fed steers sold at an advance of 2 to 3 cents per pound over purchase price. His laconic expression when getting his record for 1917 was " Never again."

Number 6 dropped very low in 1916. He had a high priced team of work horses which went blind, and he stood lower in rank in yield per acre of wheat than any other year.

Number 7 dropped quite low in relative standing in 1914. He is one of the best wheat growers of the 25 farmers. I mean he obtains comparatively high yields per acre in which he usually ranks first or second, but in 1914 he ranked thirteenth in wheat yield per acre. He also ranked much lower in yield per acre of corn than ordinarily. It will be observed that Number 7 ranked better the latter years than in earlier years. This is explained in a general way by his type of farming. His main sources of receipts are sheep and wheat, the price of wheat and wool advanced more than some other products, and he was usually able to obtain better prices than his neighbors—mainly on account of the time he sold.

Number 8 had just begun farming in 1912, and had scarcely established himself in the business. In 1913 he rented additional land and had larger crop acreage than other years. After 1913 he had rather uniform crop acreage and there is not a great deal of variation in his relative standing.

We believe these illustrations should be sufficient for establishing that there must be considerable variation in the incomes of individual farmers, even though the incomes of entire groups from year to year may be fairly constant. The other seventeen farmers in the Ohio group show as much variation as those we have been considering, and either the Wisconsin or Indiana area tells the same story.

Selecting the Best Farms in an Area from a Single-Year's Study.

In the earlier years of farm management surveys, we were taught that the casual observer, or for that matter, one trained in analyzing the business of farmers, could not select the best farmers in an area by observations on the general surroundings. Our experience in farm management survey work confirms this, and our experience in the study of farms for successive years leads us to believe that even after a single year's study, there is considerable chance for error in selecting the best farmers, as determined by those with highest average labor incomes over periods of five or six years.

The reason for this chance of error is obvious, since most individual farmers show considerable variation from year to year, and our study along this line leads us to question the value of ranking farmers, individually or in very small groups, with only a single year's study. (Table VII.)

Table VII shows our investigations along this line in the Ohio, Wisconsin and Indiana areas. Perhaps we will be able to present the subject more clearly if we assume there are 100 farms in our study. Now, if any year we select the 10 farms with highest labor incomes, we may expect only 4.5 of these 10 will be among the 10 with highest average labor incomes over a five- or six- year period. In other words, our selection is only 45 per cent. reliable. If we select the 20 farms with highest labor incomes our selection is 61 per cent. reliable; if we select 30 of the 100 farms our selection is 64 per cent. reliable; if we select 40 farms our selection is 70 per cent. reliable; and if we select 50 farms or one-half of them, our selection is 76 per cent. reliable. We believe this emphasizes the importance of using wide groupings of farms when we have but a single year's study, and that in many instances the study of an individual farm for a single year will only lead to erroneous conclusions.

TABLE VII.—*Reliability in the selection of best farmers as indicated by their labor incomes for a single year in the Ohio, Wisconsin and Indiana areas.*

Percentage Groups of all Farmers Selected as Best in a Single Year's Studies, Per Cent.	Degree of Reliability of Single Year Selection as Determined by Average Labor Incomes Over a Period of Years, Per Cent.
10	45
20	61
30	64
40	70
50	76

It was of interest to us in trying to find an indication as to the number of years that it might be well to conduct studies of individual farms. So an experiment was made with the relative standing in labor incomes of the 25 men in the Ohio area over a six-year period. We determined the rank in labor income of each farmer for 1912, the first year of the study. Then we determined the rank of each for the average of 1912 and 1913, or a two-year average, then the three-year average, and so on to the six-year average.

When comparing the standing as determined by the first year and the two-year average, we find there were 21 farmers whose relative standing was changed, when comparing the two-year and the three-year average, there were 18 whose relative standing was changed, and when comparing the five-year and the six-year averages, there were 15 whose relative standing was changed. As we said a while ago, we are little concerned when the relative standing varies but one or two places. When allowing for a variation of two places each time, instead of using the identical standings we find there were fourteen farmers who changed their relative standing when comparing one-year with the two-year average, twelve when comparing the two-year and the three-year average, and only four changed relative standing more than two places when comparing the five-year and the six-year averages.

Increasing Size of Business.

It is a well-established principle that the size of business is one of the leading factors affecting farm profits. This principle has been emphasized in practically all the presentations of farm management surveys. But we have sometimes heard the criticism that it has been emphasized to such an extent, that whether intentionally or otherwise, it may sometimes carry to the reader that every farmer should increase the size of his farm. Perhaps this criticism is well-founded, and our continued surveys show that not every farmer who has increased the size of his farm has been able to increase his labor income, or his relative standing among his neighbors. The ability of the individual farmer is of prime importance. For instance, the first consideration for an 80-acre farmer in the Corn Belt who is making a lower labor income than his neighbors on farms of equal size is making good on his 80, rather than getting more land.

Single Years' Studies versus Continued Studies.

The results of our surveys carried on over a period of years on the same farms do not in any way conflict with or discredit the one-year studies. In fact in a study of the broad economic principles affecting an agricultural area or type of farming, the single year surveys probably have the greater value in that a larger number of farms can be studied than is practicable in the continued work.

There are, however, a number of well-recognized types of farming carried on in different sections of the country such as, the fruit farming area of Virginia, the trucking districts of Florida, the citrus fruit districts, the dry farming districts of the West, etc., where it is nearly impossible to obtain results for one year that will give a true status of conditions prevailing over a period of years and in covering a study of the economic phases under such conditions, the work when carried over a period of years has a much greater value.

The continued work also has an added advantage over the one-year study, when carried on for any given area, of giving reliable information regarding the trend of agricultural development.

DISCUSSION OF PAPER BY H. W. HAWTHORNE.

F. D. Gardner: The bottom of Table I is very significant. Is the increase in labor incomes due to war conditions? Did the influence of the continuous survey itself have anything to do with the increased labor incomes?

Mr. Hawthorne: The farmers increased their business by speeding up in production as shown in Table IV. As to the influence of the surveys themselves in increasing the labor income, of course, I would not like to say. We know, however, that farmers study the reports of the analysis of their own farm business which we return to them each year, and that they have such interest in the bulletins published as to request copies sent to friends in neighboring localities.

L. A. Moorhouse: Why did No. 3 make such a consistently poor record?

Mr. Hawthorne: Because he was a consistently poor farmer. Farmer No. 1 made the highest average labor income for the six-year period, and Farmer No. 3 the lowest. There is less than ten acres difference in the size of their farms, but Farmer No. 3 had a smaller crop acreage and carried much less live stock than Farmer No. 1. He also had poorer crop yields and received lower returns from his live stock. He had comparatively poor quality and he simply lacked the ability to conduct a successful farm business. He is a well read man, a good conversationalist and all that but it is not in him to make good.

Mr. Gardner: What is the range of labor income from these farms?

Mr. Hawthorne: The six-year average for Farm No. 1 was around $800; for Farm No. 3 a minus $200.

K. C. Livermore: Can you tell us the relative size of the business on the high and low labor income farm?

Mr. Hawthorne: Not exactly. Approximately, the crop acreage was one-half larger and the amount of live stock three times greater on the high labor income farm than on the low labor income farm.

Mr. Livermore: If No. 1 goes on to No. 3's farm would he enlarge the business?

Mr. Hawthorne: Certainly.

E. H. Thomson: What is your experience as to the number of records farmers are keeping where continued surveys are being carried on? After the first year or two are more men able to give records from books?

Mr. Hawthorne: There is quite an increase in the number of these men who are keeping books. I was agreeably surprised in the Ohio area this fall to find some farmers who had summarized the year's business, and we were all able to obtain more of the sales and of the expenses from books than in the early years of the survey. A study of these farms in Ohio and Indiana areas shows that more farmers are keeping accounts in the later than in the earlier years of the surveys.

EDUCATION.

" It may be that Federal aid will be extended to the public school system. If this time ever comes we should see to it that the Federal money comes through the states so that the school system cannot be dominated by a Federal Bureau. The Federal supervision should be limited to seeing that the funds are used for education. There should be no Federal power to dominate the schools or use them for propaganda purposes. The nearer local government is left to local agencies the greater the return per dollar spent and the greater the growth in ability in democratic government."

G. F. WARREN.